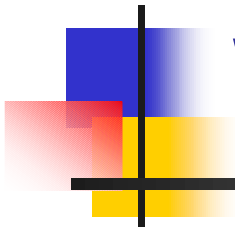


VILLAGE POWER 2000

EMPOWERING PEOPLE AND TRANSFORMING MARKETS

4th – 8th December 2000

Washington, D.C.



Ghana: Renewable Energy for Rural Electrification

Clement G. Abavana

RESPRO, Ghana



Project Budget & Implementation

- Initial Budget (3-year)
 - \$2.5 million GEF grant funds
 - \$0.5 million Government of Ghana (including \$300,000 in PV equipment)
 - ca. \$100K USDOE/NREL co-financing for technical support
- Implementation (nationally executed)
 - Ministry of Finance (executing agency)
 - Ministry of Mines and Energy (implementing agency) through the RESPRO Office
- Collaborating institutions include:
 - Kwame Nkrumah University of Science and Technology, Kumasi, Ghana
 - NREL (United States)



Project Goals (i)

- Build in-country capacity in the use of renewable energy technologies especially PV, PV/wind, PV/Diesel hybrid power systems for sustainable rural electric power delivery, focused on
 - -Economically productive activities
 - -Community services
 - -Household non-thermal energy
- Establish the technical, economic, financial, institutional and socio-cultural requirements for sustainability.



Project Goals (ii)

- Demonstrate the bankability and financial sustainability, as pre-investment prelude to commercial diffusion
- Establish technical and service performance standards for private sector service companies



Project Concept

- To have a project which addresses core issues in rural social & economic development:
 - i. Purification and pumping of clean water
 - ii. electrified dispensaries and health clinics
 - iii. refrigeration, household lighting, telecommunications, education, entertainment, public and street lighting.

- Project therefore focuses on the use of commercially proven solar PV- systems in 13 rural communities in the East Mamprusi District of Northern Ghana



Project Design

- Designed to address Ghana Government's interest in assessing the technical, economic and institutional requirements for providing renewable energy-based electricity to off-grid communities.



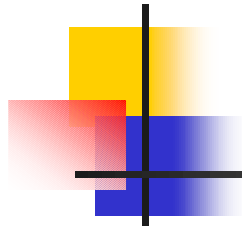
Original Concept

- Electric Utility Involvement
 - To provide entry-level electrification for off- grid rural communities as least cost option for the size of loads envisaged.
 - Incorporate into the on-going rural electrification programme as next best option to grid extension.
- To provide strong utility-led programme for dissemination and support for the growth of the PV market



Private Sector Response

- Equipment installation and commissioning
- Equipment supply
 - Renewable energy equipment components, systems
 - End-use equipment supply (lights, ice makers, refrigerators, grain grinders, water purification units, ..)
- Equipment maintenance, repair, replacement
- (Eventually) supply of off-grid energy services for rural and peri-urban private power concessions
- Joint venture local manufacture



Establishment of RESPRO

- Without the utility involvement, the Renewable Energy Services Project (RESPRO) unit was established by the Ministry of Mines & Energy to manage the project whose inception was in February 1999.



Project in the context of the Ghana National Electrification Scheme

- All 120 district capitals in Ghana have been electrified
- Government policy: by 2020, electricity services are to be widely available to the rural and peri-urban populations,
- Innovative programmes are therefore needed to provide electricity services to off-grid communities on a sustainable and affordable basis



Requirements for Sustainable Off-grid Electricity Services

- Local operation and maintenance facilities
(Nakpanduri - principal centre, other local service centres and technicians)
- Local capacity for equipment manufacture, supply, installation, maintenance, and repair
- Assured fuel security (for operations, hybrid systems)
- Supply cost \leq user's willingness and ability to pay, including any external sources of revenues to the rural energy services companies



Requirements for Sustainability

- Community participation
 - Fees for electricity and associated services
 - Needs identification
- Full cost recovery to rural energy service companies
 - Mix of community and external revenues (e.g.. government infrastructure investments)
 - Willingness and ability to pay
- Co-investments in development that builds on reliable supply of electricity and electricity services
 - Ministries (water, health, education, micro-enterprise, telecommunications, etc.)



GEF Concerns

- Avoidance of GHG emissions that would have resulted from additional thermal generations to meet the rural electric load.
- Reduction in indoor pollution that would have resulted from kerosene lanterns and candles.



Implementation Issues

- Over heads are high as result of setting up a new unit
- Delayed the project
- O & M Costs very high due to remoteness of Project area
- Perception of an NGO operation providing inferior power supply and blocking the communities' chance of getting the real thing.
- Implications of non-utility involvement.



Operational Issues

- Fee-for-service
- Affordability & the Economy
 - Ability to pay (cost recovery rates)
 - Willingness to pay
 - Reality on the ground
 - Declining value of the local currency
 - Subsidized tariffs for grid-connected customers



Social Barriers

- Social justice
- Equity
- Sustainability



Political Barriers

- Political pressure:
 - Cost recovery rates vis-a-vis affordable rates
 - Election year non-policies



Table of Connections

SOLAR HOME INSTALLATIONS DONE PER MONTH			
MONTH	100WP	50WP	TOTAL
December. 1999	26	8	34
January.2000	5	1	6
February.2000	8	3	11
March.2000	19	7	26
April.2000	44	3	47
May.2000	8	1	9
June.2000	36	8	44
July.2000	27	10	37
August.2000	38	15	53
September. 2000	32	8	40
October.2000	30	8	38
TOTAL	273	72	345



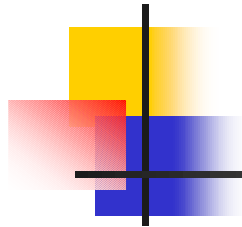
Lessons Learnt (i)

- Establishment of energy services companies (ESCOs) inherently has high overheads
- In RESPRO – high operating cost due to size and remoteness of project
- Clear government policy very necessary to create the PV market



Lessons Learnt (ii)

- Mix of strategies should be employed in the implementation of PV programmes
- Suitable policy framework with appropriate financing mechanisms are necessary to encourage wider participation



The way forward for RESPRO

- There should be utility involvement in the implementation so that optimum benefit can be derived
- The boundaries of the Project are being expanded to lower overheads
- Mode of Implementation will no longer be limited to only fee-for-service
- Energisation not electrification



Conclusions (i)

- Government should give the same level of support for solar PV as it does for grid extension rural electrification
- Solar PV and grid extension rural electrification need not be mutually exclusive. If properly planned they could actually complement each other.



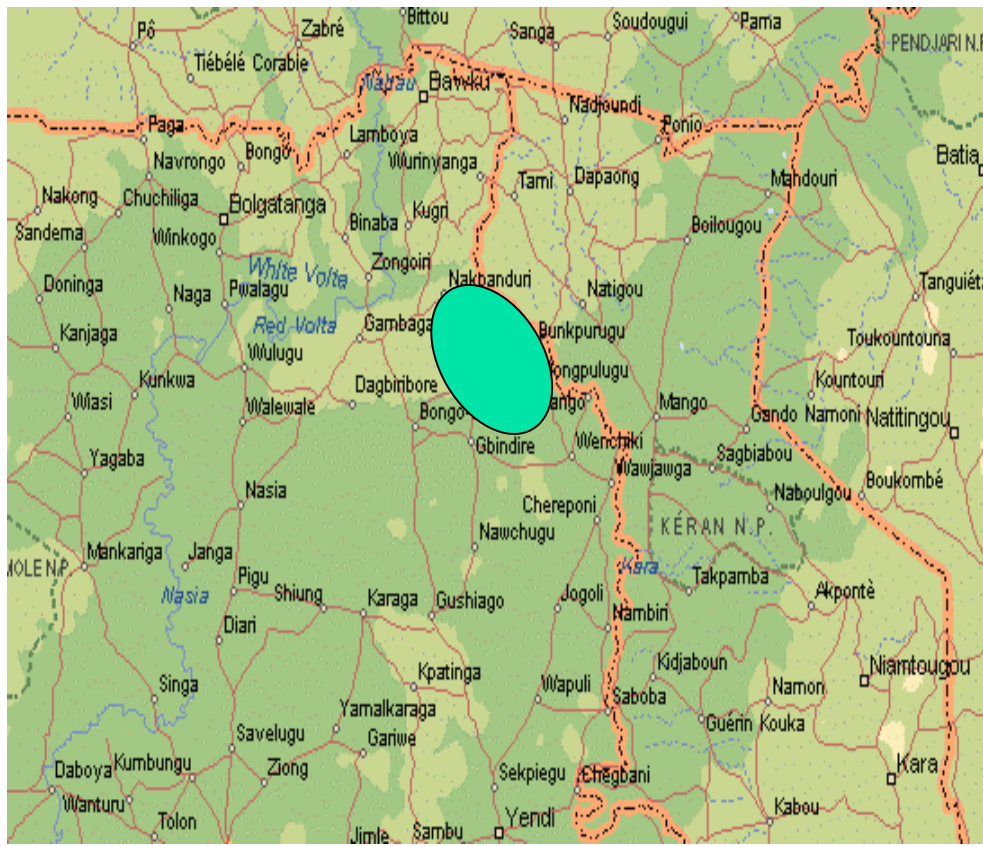
Conclusion (ii)

- PV markets can only survive in framework of sustainable energy programmes where different stakeholders operate complementing each other's contributions. The stakeholders here are:
 - **-Government (policy/regulatory framework)**
 - **-the power utility sector**
 - **-the Banks and other financial institutions.**
 - **-Business/private sector**
 - **-Society /community leaders**

Map of Ghana



Map of Project Area



- Project area shown as oval.

Public Installation



- Retrofitted well in Binde

Health Clinic in Binde



6 DEC 2000

C. G. Abavana, RESPRO, Ghana

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Community Installations



- School System in Bunkpurugu for lights, TV and VCR

Domestic Installation



- Home system in Yunyoo

Domestic Installation

- Solar home system



Public Systems

- Street Light in Bunkpurugu



Micro-enterprise



Telecommunication

- Antennae for radio telephone in Nakpanduri

